NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Surface Drainage – Field Ditch

(Feet)

Code 607

DEFINITION

A graded ditch for collecting excess water in a field.

PURPOSES

To drain surface depressions; collect or intercept excess surface water, such as sheet flow, from natural and graded land surfaces or channel flow from furrows and carry it to an outlet; and collect or intercept excess sub-surface water and carry it to an outlet.

CONDITIONS WHERE PRACTICE APPLIES

1. Have soils that are slowly permeable (low permeability) or that are shallow over barriers, such as rock or clay, which hold or prevent ready percolation of water to a deep stratum.

2. Have surface depressions or barriers that trap rainfall.

3. Have insufficient land slope for ready movement of runoff across the surface.

4. Receive excess runoff or seepage from uplands.

5. Require the removal of excess irrigation water.

6. Require control of the water table.

7. Have adequate outlets available for disposal of drainage water by gravity flow or pumping.

CRITERIA

Drainage field ditches shall be planned as integral parts of a drainage system for the field served and shall collect and intercept water and carry it to an outlet with continuity and without ponding.

Investigations. An adequate investigation shall be made of all sites. On-site soil borings shall be conducted and logs obtained on all sites proposed to collect subsurface water.

Location. Ditches shall be established, insofar as topography and property boundaries permit, in straight or nearly straight courses. Random alignment may be used to follow depressions and isolated wet areas of irregular or undulating topography. Excessive cuts, and the creation of small irregular fields, shall be avoided.

On extensive areas of uniform topography, collection or interception ditches shall be installed as required for effective drainage.

Design. The size, side slopes, and cross section area shall:

1. Be adequate to provide the required drainage for the site.

2. Permit free entry of water from adjacent land surfaces without excessive erosion.

3. Provide effective disposal or reuse of excess irrigation water (if applicable).

4. Conduct flow without causing excessive erosion.

5. Provide stable side slopes based on soil characteristics.

6. Permit crossing by field equipment if feasible.

7. Permit construction and maintenance with available equipment.

Design capacity. The ditch will have sufficient capacity to carry flow for the selected drainage curve. Minimum drainage curve capacity will be the "C" drainage curve. Design flow for the selected drainage curve will be determined from page 14-89 of the Engineering Field Manual.

The design for the ditch may be made from tables or charts based on Manning's formula for nonvegetated channels or on retardance values for vegetated channels. Nonvegetated ditches should be based on appropriate "n" values of .04 or less. Ditches that are farmed with adjoining cropland may be considered nonvegetated ditches.

Design velocity, depth, side slopes, and spacing. Permissible design velocities are shown on pages 14-26 of the Engineering Field Manual for nonvegetated channels. Ditches that are farmed with adjoining cropland may be considered nonvegetated ditches.

The minimum depth should normally be 1.0 ft below field elevation adjacent to the ditch. Depths less than 1.0 ft are permitted in the very bottom of a depression or through short reaches of small depressional areas where flooding or ponding for short periods of time will not damage crops.

Guidelines for depth and spacing of open ditches used for internal drainage of water table control are contained in the Drainage Guide for Indiana.

Side slopes shall be 2:1 or flatter in mineral soils and 1:1 or flatter in organic soils. If the ditch is to be crossed with farm equipment, the side slopes shall be 6:1 or flatter.

CONSIDERATIONS

Surface drainage should be part of the treatment needed to protect soil, water, plants, animal and air resources. In addition, a conservation cropping system, conservation tillage, crop residue management or other appropriate system should be planned to control erosion in the treatment area and protect the other resources. The management system must be planned to prevent excessive maintenance and operation problems.

Effects on water quantity and quality shall be considered. Deep percolation or ground water recharge normally will not be affected by this practice because of conditions under which this practice is applied. Runoff and interflow will be increased, but evaporation would be decreased by the removal of ponded surface water. The water table in the drained field may be lowered.

From erosive fields, this practice may increase the yields of sediment and sediment-attached substances to downstream water courses because of increase in runoff. In other fields, the location of the ditches may cause a reduction in sheet and rill erosion and ephemeral gully erosion. Phosphorus loads resulting from this practice may increase eutrophication problems in ponded receiving waters. Water temperature changes will probably not be significant. Wildlife habitat formed by standing water and wet areas may be decreased.

Special attention shall be given to maintaining and improving visual resources and habitat for wildlife where applicable. The landowner/user will be advised if wetlands will be affected and USDA-NRCS wetland policy will apply. All work planned shall be in compliance with General Manual Title 450-GM, Part 405, Subpart A, Compliance with Federal, State, and Local Laws and Regulations. If archaeological or historical properties are encountered, the USDA-

NRCS policy in General Manual Title 420-GM, Part 401 shall be followed.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing drainage field ditches shall be in keeping with this standard and shall describe the requirements for properly installing the practice to achieve its intended purpose.

Construction specifications

General. Construction operations shall be carried out in such a manner and sequence that erosion and air and water pollution will be minimized and held within acceptable limits. Construction methods that enhance wildlife will be used where practical. Trees, stumps, and brush removed from the construction area may be piled for wildlife habitat when approved by the landowner/user.

The completed job shall present an appearance of good workmanship and shall conform to the line, grades, and elevations shown on the drawings or as staked in the field.

All operations shall be carried out in a safe and skillful manner. Safety and health regulations shall be observed and appropriate safety measures used.

Site preparation. All trees, brush, stones or other objectionable material shall be disposed so that they will not interfere with the construction, operation or maintenance of the surface drain.

Excavation. The ditch shall be cut to the line and grade shown on the plans or as staked in the field.

Spoil placement. Spoil shall be spread and leveled so that the surface water can flow into the ditch. The spoil may be used to fill depressional areas or spread uniformly along the ditch. Openings will be left to provide inlets into the ditch for surface water. If no location exists for spoil, double channels may be constructed and the spoil placed between the two channels.

If the spoil is to be farmed, it shall be spread so that farming operations will not be hindered.

Construction tolerances. The following are guidelines for field ditch construction:

Channel: Grade to 0.2' below
Top width and bottom width: 10% wider not to exceed 5' and 2' respectively.

There will be no reverse grade. Side slopes will be nominally to grade with no unsightly humps or hollows.

OPERATION AND MAINTENANCE

A maintenance program shall be established by the landowner/user to maintain the capacity of the field ditch. The grade and cross section will be maintained to permit effective drainage to the outlet. Items to consider are:

Remove silt and sediment accumulations in the channel cross-section as soon as practical to prevent buildup and drainage blockage.

Promptly repair eroded areas.

Periodically inspect area for any new maintenance items and if any are observed take immediate action to protect from further damage or deterioration.